



Lessons Learned from FoodNet Special Studies, 1996-2007

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FoodNet Objectives

1. **Determine the burden** of foodborne illness in the United States
2. **Monitor trends in the burden** of specific foodborne illness over time
3. **Attribute the burden** of foodborne illness to specific foods and settings
4. **Develop and assess interventions** to reduce the burden of foodborne illness

Special Studies

- Case-control studies
 - Identify risk factors for sporadic illness
- Surveys of community
 - Identify risky food behaviors and consumption habits
- Cohort studies
 - Estimate effect of risk factors on outcome

Risk Factors for Sporadic Illness

Background

- Outbreaks represent small fraction of foodborne illnesses
 - ~6% cases in FoodNet 2006
- Risk factors for sporadic cases may be different than for outbreaks
- To better identify risk factors for sporadic cases, FoodNet conducts case-control studies

FoodNet case-control studies

- 12-month population-based studies
- Cases and controls interviewed using standardized questionnaire
 - Cases: Laboratory-confirmed cases reported to FoodNet
 - Controls: Randomly selected persons residing in the FoodNet catchment area

FoodNet Case-Control Studies

- 18 case-control studies completed
 - *Campylobacter*, *E.coli* O157:H7, *Listeria monocytogenes*, *S.Enteritidis*, *S.Newport*, *S.Heidelberg*, *S.Typhimurium*
- Current study
 - Selected *Salmonella* serotypes (*S.Javiana*, *S.Infantis* and *S. I 4,[5],12:i:-*) began Jan 2007

Campylobacter

- Common cause foodborne illness
 - infants and males
- Outbreaks are rare
 - raw milk, undercooked poultry, contaminated water
- Case-control study (1998-99):
 - International travel, eating chicken, turkey or non-poultry meat prepared in a restaurant, having a pet puppy, contact with farm animals, raw seafood
 - Foreign travel and eating chicken or turkey at commercial food establishments are particular risks for ciprofloxacin-resistant *Campylobacter* infection

Campylobacter

- Infant case-control study (2002-2004):
 - 0-6 months:
 - Breast feeding was protective
 - Drinking well water and riding in a shopping cart next to meat or poultry associated with illness
 - 7-11 months:
 - Visiting or living on a farm, having a pet with diarrhea in the home and eating fruits and vegetables prepared in the home were associated with illness

Escherichia coli O157

- Infection can result HUS
 - most common cause of acute kidney failure in children in North America
- Ground beef is common vehicle
- Case-control studies (1996-97 and 1999-2000):
 - Eating pink hamburger, eating at a restaurant, lived on/visited farm, visited farm with cows
 - Eating pink hamburgers, drinking untreated surface water, contact with cattle



Listeria monocytogenes

- Has a high case-fatality rate
 - Elderly, immunocompromised, newborns and pregnant women at highest risk
- Unpasteurized dairy products, deli meats common sources
- Case-control study (2000):
 - Eating melons at a commercial establishment, hummus prepared at commercial establishment, living on a cattle farm



Salmonella case-control studies

- *S. Enteritidis* (1996 and 2002):
 - Chicken prepared outside home
 - International travel, undercooked egg inside home, chicken outside the home, having bird or lizard at home
- *S. Heidelberg* (1996)
 - Eating eggs away from home
- *S. Typhimurium* (1996)
 - Patient with multi-drug resistant infection more likely to have received an antibiotic
- *S. Newport* (2002)
 - Eating undercooked ground beef and runny eggs prepared at home were risk factors for multi-drug resistant infection



Salmonella case-control studies

- Infant case-control study (2002-2004):
 - Breast feeding decreases risk
 - Exposure to reptiles, riding in a shopping cart next to meat or poultry, international travel, attending daycare with child has diarrhea, or having consumed concentrated liquid infant formula in previous 5 days were associated with illness



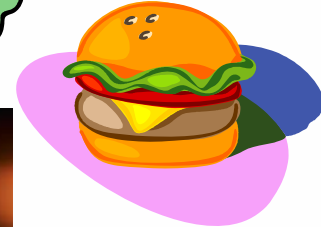
Risky Behaviors

FoodNet Population Survey

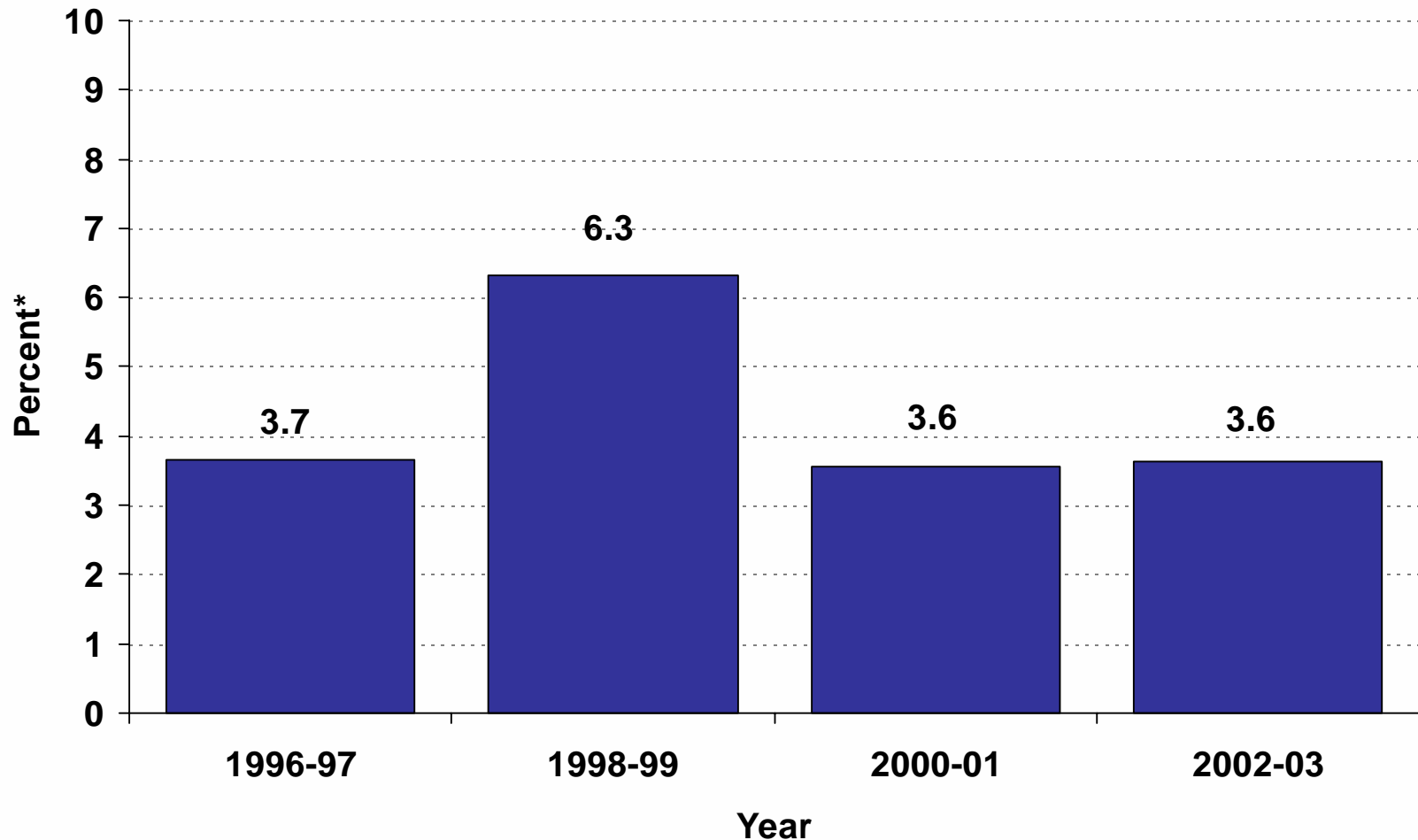
- Telephone survey using random digit dialing
- Five 12-month cycles completed
 - 1996-97, 1998-99, 2000-01, 2002-03, 2006-07
 - ~70,000 interviews
- Questions:
 - Foods consumed in past 7 days
 - Diarrheal illness
 - Medical care seeking behaviors
 - Travel
 - Demographics

“Risky” Foods

- Pink chicken
- Pink turkey
- Pink hamburgers
- Pink ground pork
- Raw fresh fish
- Raw shellfish
- Raw/unpasteurized milk
- Runny eggs
- Alfalfa sprouts
- Unpasteurized apple juice/cider

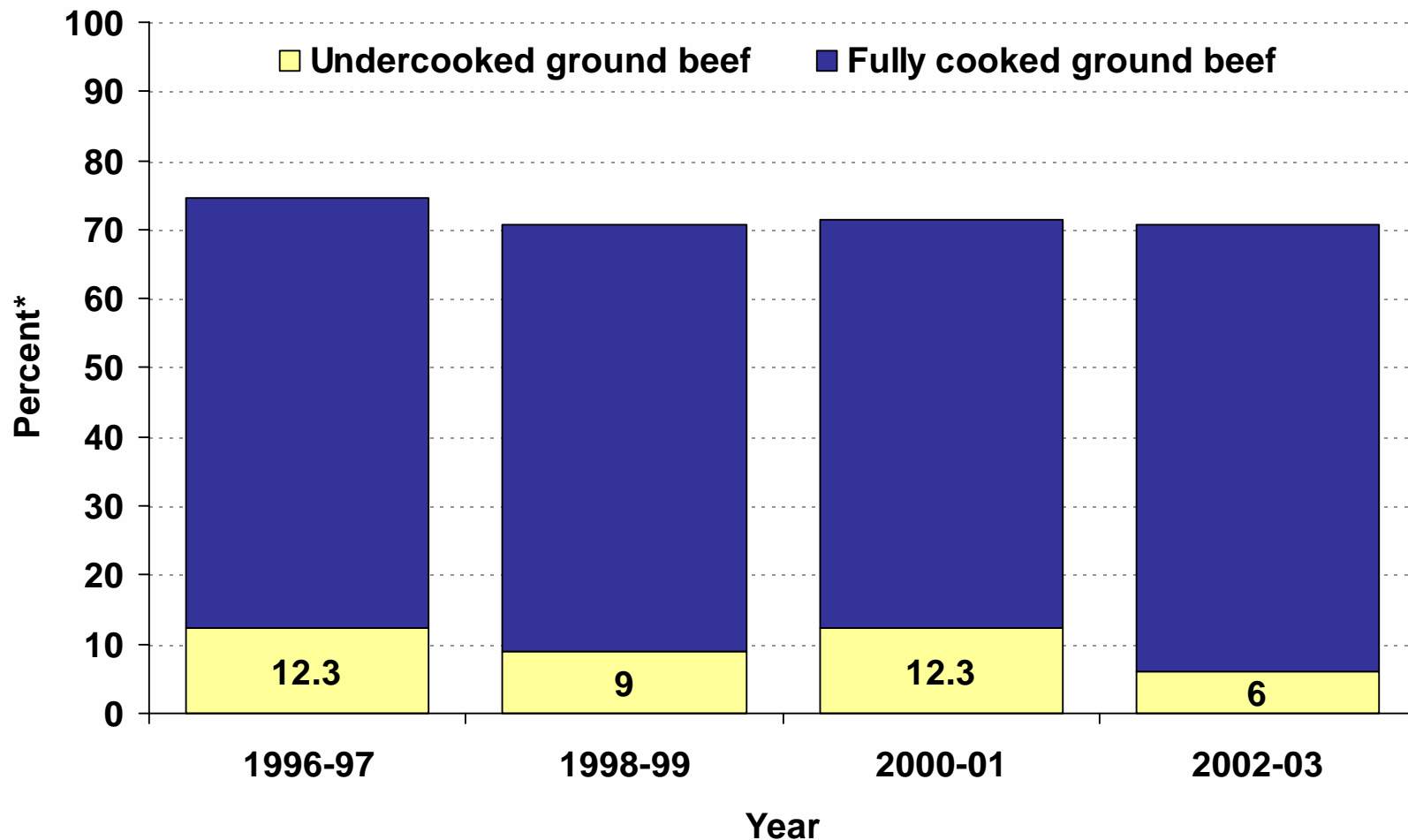


Percent of Population Reporting Consumption of ≥ 2 Risky Foods, Population Survey, 1996-2003



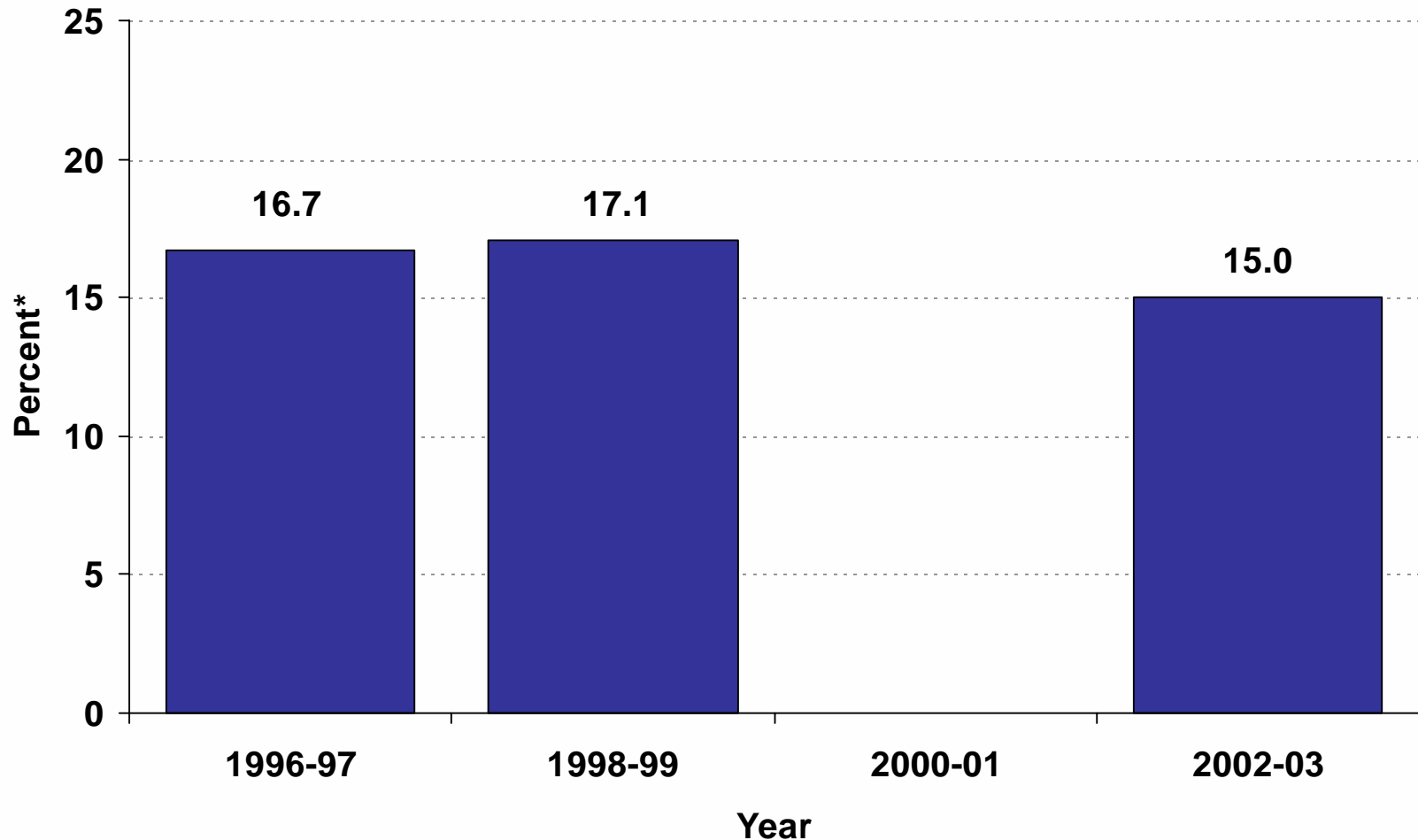
* Based on weighted estimates

Percent of Population Reporting Consumption of Ground Beef, Population Survey, 1996-2003



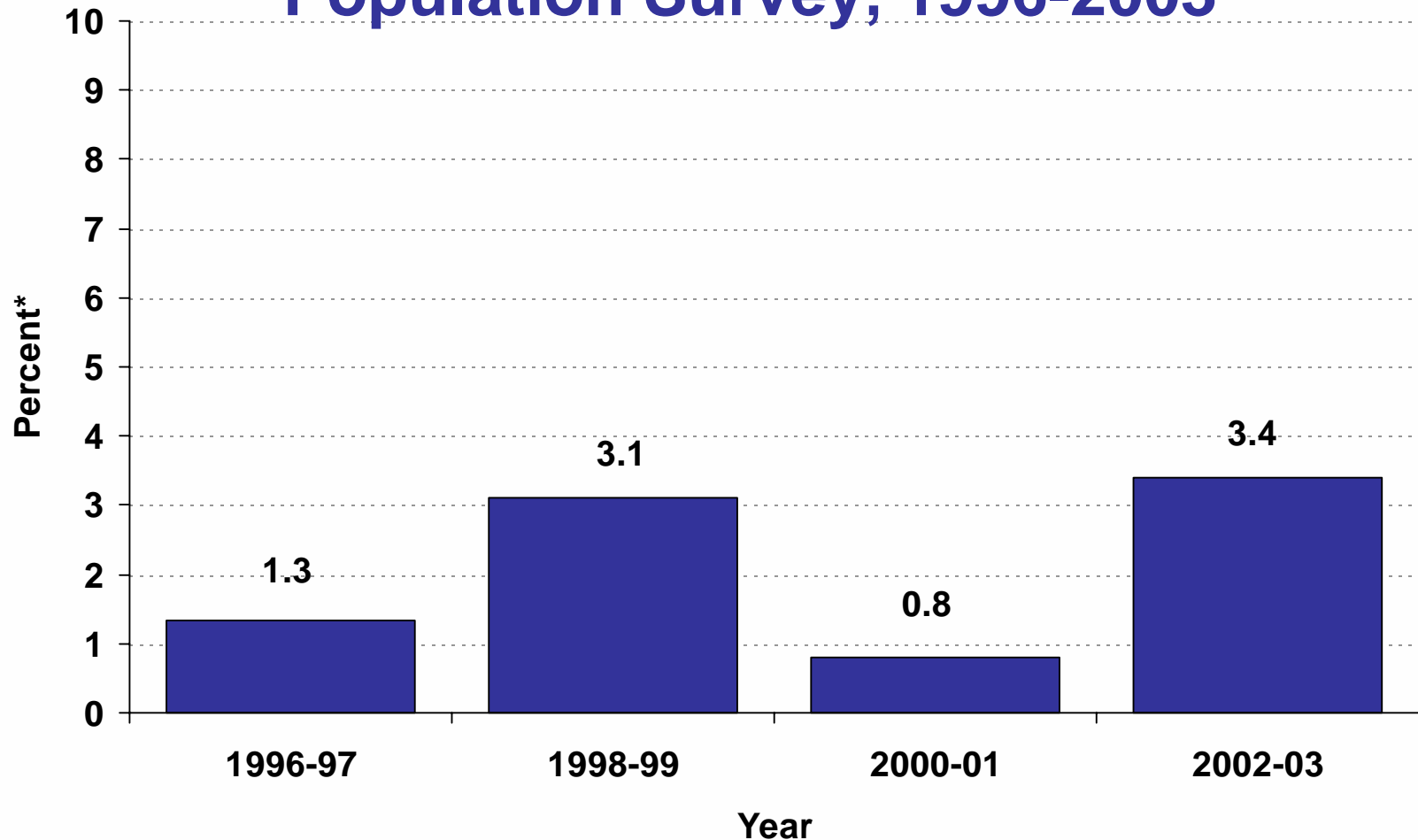
* Based on weighted estimates

Percent of Population Reporting Consumption of Runny Eggs, Population Survey, 1996-2003



* Based on weighted estimates

Percent of Population Reporting Consumption of Unpasteurized Milk and Milk Products, Population Survey, 1996-2003



* Based on weighted estimates

Association Between Ethnicity and Risky Food Consumption (Population survey 2002-03)

	% That Ate Risky Foods	OR	C.I.	P-value
White	21%	--	--	--
African-American	15%	0.64	0.5-0.8	<0.001
Hispanic	25%	1.3	1.0-1.6	0.02
Asian/Pacific Islander	32%	1.7	1.3-2.3	<0.001
Other/Mixed Race	23%	1.2	0.8-1.8	0.4

Interaction Between Age, Immunosuppression & Risky Food Consumption: Population Survey 2002-03

	% That Ate Risky Foods	OR	CI	P-value
Under 18				
Immunosuppressed	21%	2.2	1.5-3.2	<0.001
Healthy	14%	--	--	--
18-64				
Immunosuppressed	29%	1.2	1.0-1.3	0.03
Healthy	28%	--	--	--
Over 65				
Immunosuppressed	25%	1.1	0.8-1.4	0.5
Healthy	24%	--	--	--

Survey of long-term care facilities (2005)

- Only 3/865 completely followed national recommendations for *Listeria* prevention
- 9% served soft cheese made from unpasteurized milk
- Most routinely serve deli meats, few heated before serving
 - 19% roast beef, 13% turkey, 11% ham
- 62% used whole shell eggs
 - 92% used pasteurized liquid egg
- Use irradiated products
 - 7% ground beef, 6% poultry

Eating in restaurants: a risk factor for foodborne disease?

- Population survey (1998-99):
 - Persons eating at fast food restaurants >5 times week more likely to report GI illness
- Case-control studies (1999-2002):
 - *E.coli*: eating at table-service restaurant, pink hamburger away from home
 - *Salmonella*: consumption of eggs in restaurant, chicken outside home
 - *Campylobacter*: eating chicken, turkey, non-poultry meat prepared at a restaurant
- Outbreaks (1998-2004):
 - 52% associated with restaurants or delis

Conclusion

- Risk factors vary by pathogen
- Consumption of risky foods has declined but many at-risk groups continue to eat risky foods
- Education messages need to focus on disease-specific risk factors and target high risk groups
- Attention should be focused on food-service establishments and those serving high-risk individuals

Interventions Working Group

- Goal: Widely disseminate research findings gained through FoodNet active surveillance and special studies
- Monthly/bi-monthly conference calls
- Representative from ten sites, FSIS, FDA
 - PFSE
- Recent project:
 - Long-term care facility survey

IWG: 2007 Goals

- Identify educational messages from recent FoodNet publications
 - Prepare article summaries
- Improve utilization of FoodNet website
- Develop dissemination strategy
 - Identify “new” conferences at which to present findings
 - Publish two issues of Foodnet newsletter
 - Post article summaries to FoodNet website
 - Identify new public and private partnerships and strengthen existing partnerships



Thank you!

<http://www.cdc.gov/foodnet>

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